NEPISIGUIT/CHALEUR REGION EXISTING VERSUS REGIONAL RESIDENTIAL WASTE COLLECTION SYSTEMS

Prepared for:

New Brunswick Department of the Environment

Prepared by:

Fiander-Good Associates Ltd.

August, 1990

Suite 200, 335 Queen Street,
P.O. Box 207, Fredericton,
New Brunswick E3B 1B1
Phone: (506) 458-8455
Fax: (506) 452-2729

FGA FIANDER - GOOD ASSOCIATES LTD

Suite 200, 335 Queen Street, P.O. Box 207, Fredericton, New Brunswick E3B 1B1
Phone: (506) 458-8455
Fax: (506) 452-2729

FGA FIANDER - GOOD ASSOCIATES LTD.

August 7, 1990 90-0612-02

Mr. Robert Lutes
Manager
Solid Waste and Recycling Section
Operations Branch
NB Department of the Environment
P.O. Box 6000
Fredericton, NB
E3B 5H1

Dear Bob:

Please accept this report entitled, Nepisiguit/Chaleur Region Existing Versus Regional Residential Waste Collection Systems. Ten copies have been forwarded to you for your use and distribution.

It has been our pleasure to have worked with you and Pegi on this project, and we look forward to working with you again on other projects in the future.

Thank you.

Yours truly,

TR Holyoke

Tim R. Holyoke, M.Sc.Eng.
Manager of Special Projects

/ks

cc. Ms. Pegi McKay, P.Eng.

TABLE OF CONTENTS

Chapter Number	Title	Page Number
1.0	INTRODUCTION	1.1
2.0	EXISTING COLLECTION SERVICES	2.1
3.0	LARGER SCALE REGIONAL COLLECTION SYSTEMS	3.1
	3.1 Run #1 Collection System	3.1
	3.2 Run #2 Collection System	3.1
4.0	COST COMPARISON	4.1
5.0	SUMMARY	5.1

1.0 INTRODUCTION

The purpose of this analysis is to examine the cost to the Nepisiguit/Chaleur Region of using existing residential waste haulers versus larger scale regional collection systems. The results provide some insight into the potential to achieve scale economies through use of larger regional waste collection operations in place of the small parcel collection service contracts as exist in the Region.

The Nepisiguit/Chaleur Region occupies the western part of Gloucester County, which excludes the Acadian Peninsula Region in the eastern part of the County. The Region presently operates a Regional Sanitary Landfill Site in the remote unpopulated area of Red Pine Station located along Route 360 west of Allardville and south of Bathurst.

At present all residential wastes are collected at roadside throughout the Region and direct hauled to the Regional Landfill site. The five incorporated municipalities are responsible for their own collection service operations or contracts. The Nepisiguit/Chaleur Region Solid Waste Management Commission is responsible for negotiating collection service contracts for the unincorporated areas of the Region. A flat fee is charged to all residents of the unincorporated areas of the Region for waste collection services, regardless of their proximity to the Regional Landfill Site.

All data used in the SWATMODEL 2.0 collection system evaluation runs are in accordance with the data supplied by the New Brunswick Department of the Environment. Two SWATMODEL runs have been completed for two collection system zone aggregations:

1). RUN #1: MUNICIPAL AND FOUR RURAL AREA ZONES; and
2). RUN #2: FOUR REGIONAL ZONES.

To ensure equitable comparison of the residential waste collection service costs of aggregated collection zones versus the existing service areas, only direct haul roadside collection systems similar to the existing services provided, have been evaluated.

The costs determined in this analysis are for residential waste collection and delivery services to the Regional Landfill Site only. No tipping fees or site access road infrastructure construction costs are included with the collection system costs. Commercial and industrial waste and collection services are not included in this analysis. No Provincial funding of operations or capital are included in the costs.

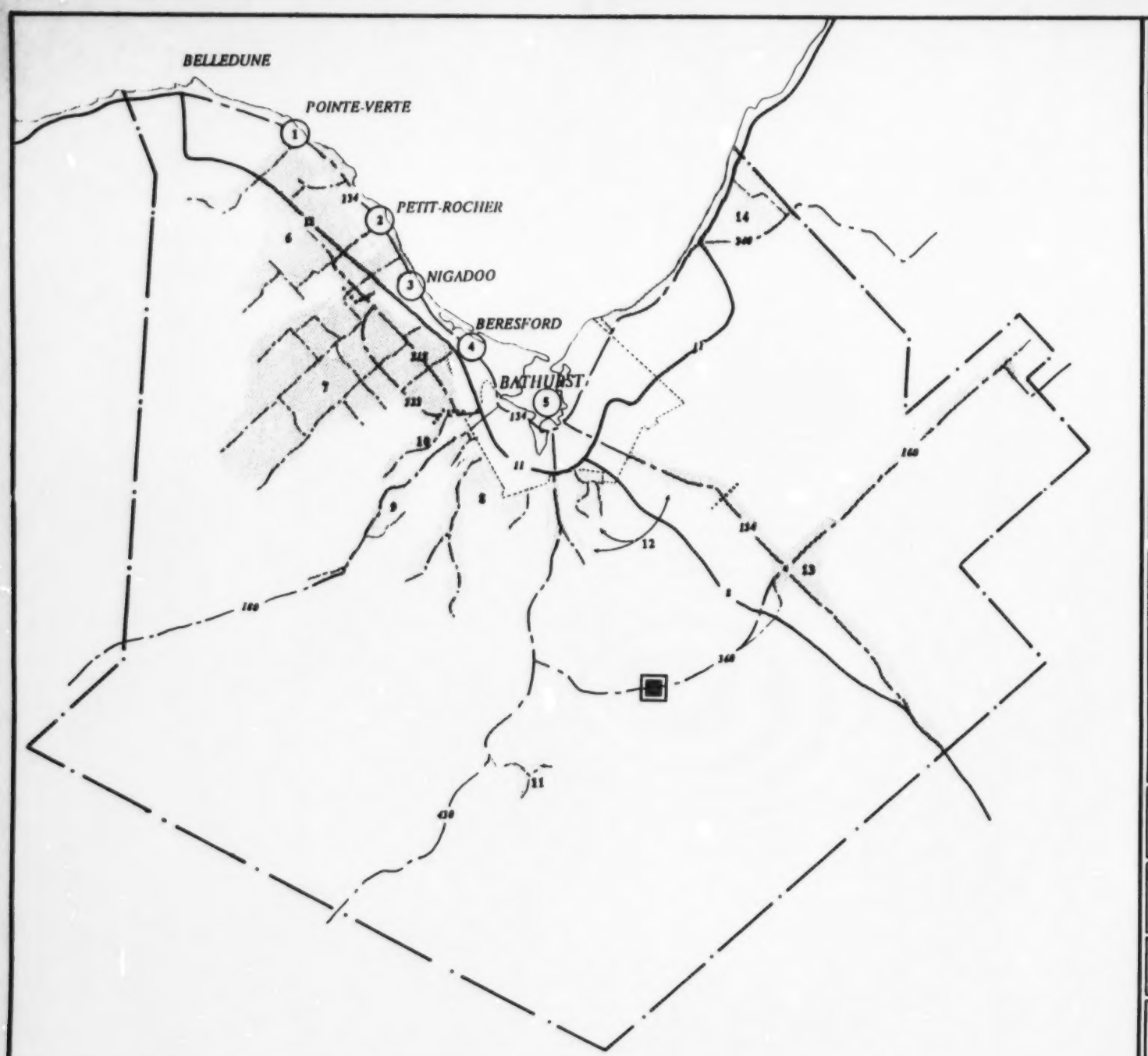
2.0 EXISTING COLLECTION SERVICES

At present the Nepisiguit/Chaleur Region is divided into 14 residential waste collection service areas. Of these five are incorporated municipalities - City of Bathurst, Town of Beresford, Village of Petit-Rocher, Village of Nigadoo and the Villages of Belledune and Pointe-Verte. The City of Bathurst and the Villages of Belledune and Pointe-Verte provide their own publicly operated roadside waste collection services. The other three municipalities contract out for roadside waste collection.

The unincorporated areas of the Nepisiguit/Chaleur Region are divided into nine residential waste collection service areas. The Commission negotiates roadside collection service contracts on behalf of all unincorporated area residents.

Figure 2.1 indicates on a map of the Region the 14 residential waste collection service areas. Table 2.1 presents a summary of the number of households, waste tonnages, type of service and annual cost of each residential waste collection service area for 1990. The total cost to the Region for residential waste collection is $818,503. This is equivalent to an average of $71.06 per tonne, or $60.54 per household.

The incorporated municipalities constitute $438,777 of the total waste collection cost in 1990. This results in an average of $62.70 per tonne and $52.17 per household. In the unincorporated areas waste collection costs in 1990 are $379,726, or an average of $84.01 per tonne and $74.30 per household.



LEGEND:

- STUDY AREA BOUNDARY
- RURAL HAULAGE ROUTES
- (6) MUNICIPALITY
- HIGHWAYS
- REGIONAL LANDFILL SITE

KEY TO HAULAGE ROUTES:

1. BELLEDUNE/POINTE-VERTE
2. PETIT-ROCHER
3. NIGADOO
4. BERESFORD
5. BATHURST
6. ELMTREE RIVER
7. FREE GRANT
8. MIDDLE RIVER/LITTLE RIVER
9. STE. ANNE/SOUTH TETAGOUCHE
10. NORTH TETAGOUCHE
11. GRAND FALLS
12. MIRIMICHI RD/BIG RIVER/ PAPINEAU/ROUGH WATERS
13. ALLARDVILLE/ST. SAUVEUR
14. SALMON BEACH

PROJECT TITLE:

NEPISIGUIT-CHALEUR REGION
EXISTING VS. REGIONAL SYSTEMS

DRAWING TITLE:

FIGURE 2.1
EXISTING COLLECTION SYSTEM

FGA FIANDER-GOOD ASSOCIATES LTD

PROJECT #:	DATE:
612-02	JUNE/1990

Table 2.1

EXISTING NEPISIGUIT/CHALEUR REGION RESIDENTIAL
WASTE COLLECTION SERVICES (1990)

	Collection Service Area	Households	Tonnage	Service	Annual Cost
1.	Belledune/Pointe Verte	600	575	2-man rear-load compactor	$40,000
2.	Petit-Rocher	850	70	3-man rear-load compactor	$33,377
3.	Nigadoo	260	353	3-man 3-ton open truck	$20,000
4.	Beresford	1,200	1,250	3-man rear-load compactor	$115,000
5.	Bathurst	5,500	4,080	1-man side-load compactor	$230,400
6.	Elmtree River	813	719*	3-man rear-load compactor	$68,292
7.	Free Grant	1,270	1,123	3-man rear-load compactor	$115,824
8.	Middle River/Little River	122	108*	1-man 1-ton truck	$10,248
9.	St. Anne/South Tetagouche	571	505*	3-man 1-ton truck	$37,686
10.	North Tetagouche	220	195*	2-man rear-load compactor	$17,820
11.	Grand Falls	39	34*	1-man half-ton truck	$3,000
12.	Miramichi Road/Big River/ Papineau/Rough Waters	716	633*	2-man 1-ton truck	$47,256
13.	Allardville/St. Sauveur	885	783*	1-man 1-ton truck	$53,100
14.	Salmon Beach	475	420*	1-man 1-ton truck	$26,500

* Tonnages of Rural Area Zones estimated based on total Unincorporated Area average of 884.4 kg. per household per annum of residential waste.

3.0 LARGER SCALE REGIONAL COLLECTION SYSTEMS

SWATMODEL 2.0 has been used to determine the costs of waste collection for large scale residential waste collection systems applied to the Nepisiguit/Chaleur Region. Two larger collection system zone aggregations have been established to run in SWATMODEL:

RUN #1: MUNICIPAL AND FOUR RURAL AREA ZONES; and
RUN #2: FOUR REGIONAL ZONES.

3.1 Run #1 Collection System

SWATMODEL RUN #1: Municipal and Four Rural Area Zones, is comprised of the five municipal zones --- City of Bathurst, Town of Beresford, Village of Petit-Rocher, Village of Nigadoo, and the Villages of Belledune and Pointe Verte --- and four rural area zones. This case retains the municipal collection operations at their present scale, but combines the nine existing unincorporated area collection service areas into four larger rural zones.

Figure 3.1 indicates the rural zone divisions, as well as all nine zone centroids of Run #1. Table 3.1 provides the zone population, households and waste tonnage input data for the collection system model analysis. The existing rural service areas, which have been combined to make rural area zones 6, 7, 8 and 9 of Run #1 are also indicated.

Table 3.2 presents the resulting annual costs of the four direct haul roadside collection systems of the SWATMODEL RUN #1 zone aggregation. Direct haul roadside collection using one-man side-load compaction vehicles provides the least-cost option for all nine zones, at a cost of $808,689. This is equivalent to an average of $70.21 per tonne and $59.81 per household.

The five municipal zones constitute $515,890 of the total annual waste collection system cost, or an average of $73.72 per tonne and $61.34 per household. The four rural unincorporated area zones annual collection system costs amount to $292,799, or an average of $64.78 per tonne and $57.29 per household.

3.2 Run #2 Collection System

SWATMODEL RUN #2: Four Regional Zones, is comprised of the City of Bathurst and three other large regional zones. This case divides the Nepisiguit/Chaleur Region into four geographic regions --- northwest, north central (City of Bathurst), south and northeast to attain larger scale operations in compatible service areas.

Figure 3.2 presents the four regional zone boundaries, as well as their respective zone centroids, for Run #2. Table 3.3 provides the regional zone population, households and waste tonnage

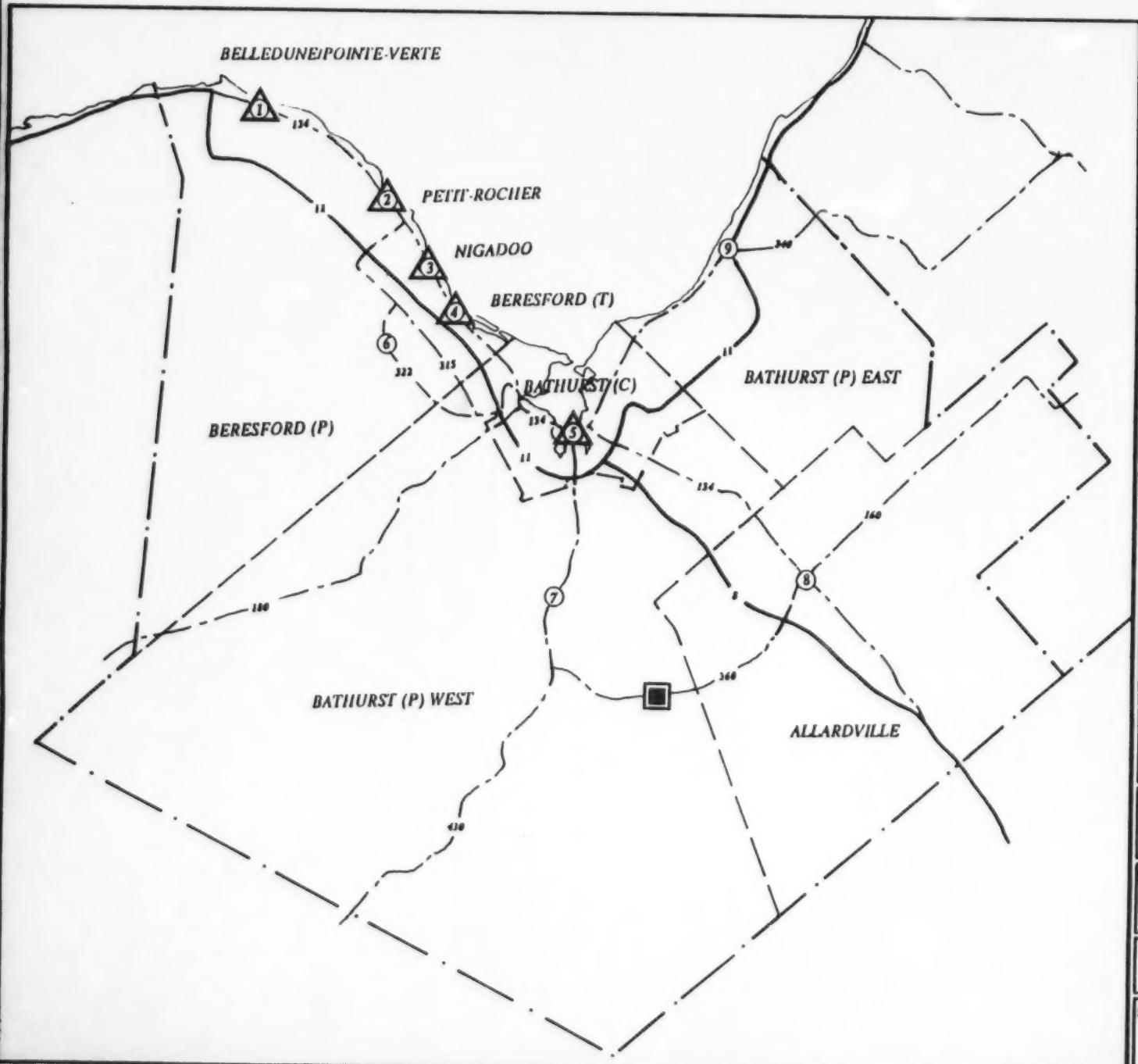

BELLEDUNE/POINTE-VERTE
PETIT-ROCHER
NIGADOO
BERESFORD (T)
BATHURST (C)
BATHURST (P) EAST
BERESFORD (P)
BATHURST (P) WEST
ALLARDVILLE
1
2
3
4
5
6
7
8
9
134
11
322
315
180
430
340
160
LEGEND:
STUDY AREA BOUNDARY
RURAL ZONE BOUNDARY
MUNICIPAL ZONE
ZONE CENTROID
HIGHWAYS
REGIONAL LANDFILL SITE
PROJECT TITLE:
NEPISIGUIT-CHALEUR REGION
EXISTING VS. REGIONAL SYSTEMS
DRAWING TITLE:
FIGURE 3.1
RUN #1 COLLECTION SYSTEM
FGA
FIANDER-GOOD ASSOCIATES LTD
PROJECT #:
612-02
DATE:
JUNE/1990

Table 3.1

INPUT DATA TO RUN #1:
MUNICIPAL AND FOUR RURAL AREA ZONES (1990)

Zones		Population	Households	Waste Tonnages
1.	Belledune/Pointe Verte (Villages)	1,836	600	575
2.	Petit-Rocher (Village)	1,924	850	740
3.	Nigadoo (Village)	974	260	353
4.	Beresford (Town)	3,851	1,200	1,250
5.	Bathurst (City)	14,683	5,500	4,080
6.	Beresford (Parish) - Elmtree River - Free Grant	6,101	2,083	1,886
7.	Bathurst (Parish-West) - Middle River/Little River - St. Anne/South Tetagouche - North Tetegouche - Grand Falls - Miramichi Road/Big River/ Papineau/Rough Waters	4,301	1,668	1,329
8.	Allardville (Parish) - Allardville - St. Sauveur	2,998	885	927
9.	Bathurst (Parish-East) - Salmon Beach	1,225	475	379

Table 3.2

RUN #1: MUNICIPAL AND FOUR RURAL AREA ZONES ROADSIDE COLLECTION SYSTEM OPTIONS ANNUAL COST SUMMARY ($ 1990)

COLLECTION SYSTEM	
Options[1]	Costs
1	$3,450,660
2	$1,344,830
3	$ 808,689
4	$ 852,387

LEAST COST OPTIONS	POPULATION ZONES[2]
3	1,2,3,4,5,6,7,8,9

LEAST COST OPTIONS COST TO NEPISIGUIT/CHALEUR REGION = $808,689

[1] The four collection system options are direct haul roadside collection systems similar to existing services, as follows:

OPTION #1: Curbside collection by 1/2 ton non-compaction truck --- direct haulage to disposal site.

OPTION #2: Curbside collection by one-ton non-compaction dump truck --- direct haulage to disposal site.

OPTION #3: Curbside collection by 25 c.y. side-load compaction vehicle --- direct haulage to disposal site.

OPTION #4: Curbside collection by 25 c.y. rear-load compaction vehicle --- direct haulage to disposal site.

[2] See Table 3.1 for definition of the nine population zones.

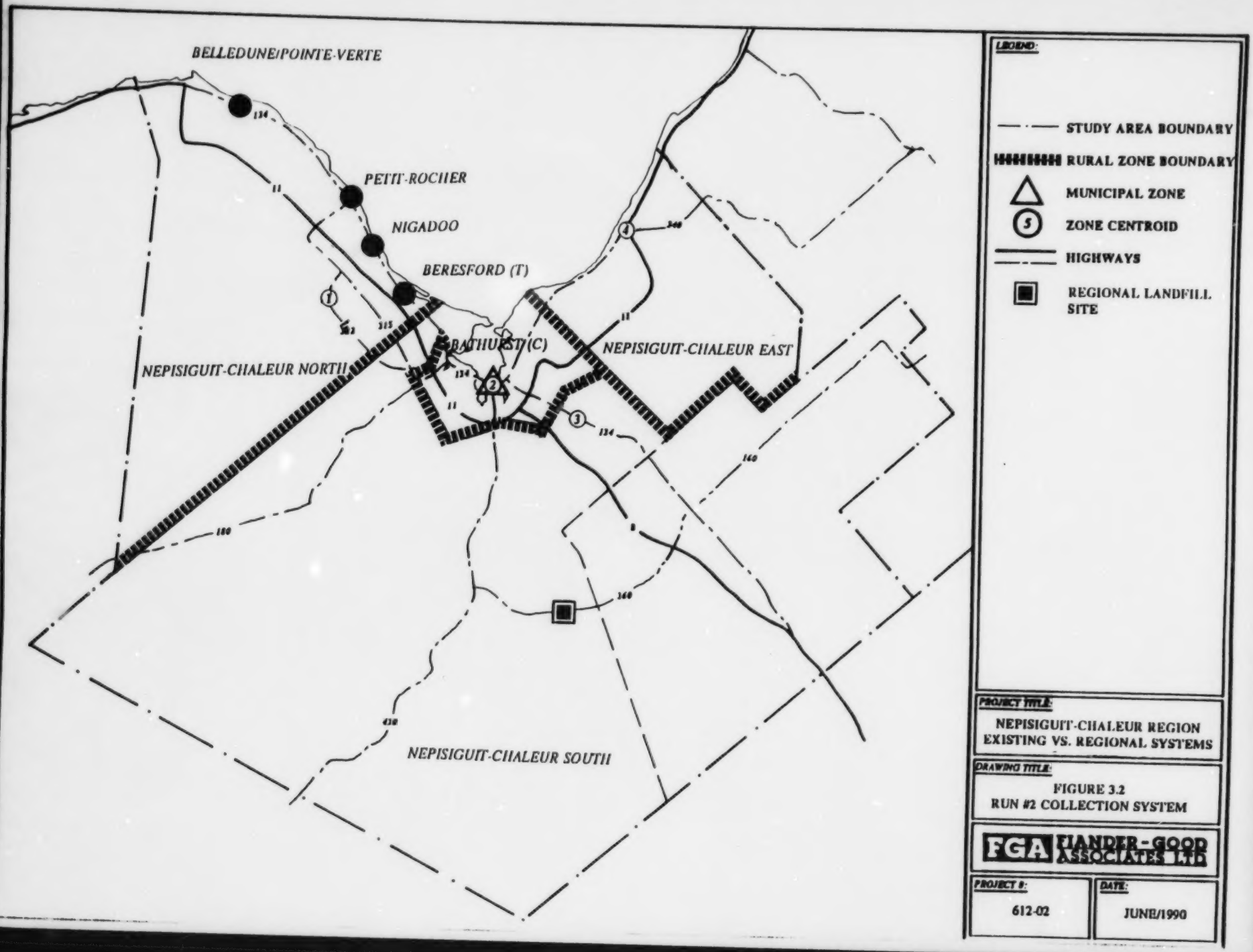

BELLEDUNE/POINTE-VERTE
PETIT-ROCHER
NIGADOO
BERESFORD (T)
BATHURST (C)
NEPISIGUIT-CHALEUR NORTH
NEPISIGUIT-CHALEUR EAST
NEPISIGUIT-CHALEUR SOUTH
LEGEND:
STUDY AREA BOUNDARY
RURAL ZONE BOUNDARY
MUNICIPAL ZONE
ZONE CENTROID
HIGHWAYS
REGIONAL LANDFILL SITE
PROJECT TITLE:
NEPISIGUIT-CHALEUR REGION
EXISTING VS. REGIONAL SYSTEMS
DRAWING TITLE:
FIGURE 3.2
RUN #2 COLLECTION SYSTEM
FGA FIANDER-GOOD ASSOCIATES LTD
PROJECT #:
612-02
DATE:
JUNE/1990

Table 3.3

INPUT DATA TO RUN #2:
FOUR REGIONAL ZONES (1990)

Zones		Population	Households	Waste Tonnages
1.	Northwest Region - Belledune/Pointe Verte - Petit Rocher - Nigadoo - Beresford (Town) - Beresford (Parish)	14,686	4,993	4,804
2.	North Central Region - City of Bathurst	14,683	5,500	4,080
3.	Southern Region - Bathurst (Parish-West) - Allardville (Parish)	7,299	2,553	2,256
4.	Northeastern Region - Bathurst (Parish-East)	1,225	475	379

input data for the collection system model analysis of Run #2. The municipal and parish components of the four regional zones are also indicated.

Table 3.4 presents the resulting annual costs of the four direct haul roadside collection systems of the SWATMODEL RUN #2 regional zone aggregation. Direct haul roadside collection using one-man side-load compaction vehicles provides the least-cost option for all four zones. This option results in an annual cost of $752,970, or an average of $65.37 per tonne and $55.69 per household.

When the six municipalities of the Region are factored out of their respective regional zones of Run #2, their total annual roadside collection system costs amount to $464,337, or an average of $66.35 per tonne and $55.21 per household. The total unincorporated area of the Region annual collection system costs amount to $288,633, or an average of $63.86 per tonne and $56.47 per household.

Table 3.4

RUN #2: FOUR REGIONAL ZONES ROADSIDE COLLECTION SYSTEM OPTIONS ANNUAL COST SUMMARY ($ 1990)

COLLECTION SYSTEM	
Options[1]	Costs
1	$3,657,765
2	$1,387,713
3	$ 752,970
4	$ 797,037

LEAST COST OPTIONS	POPULATION ZONES[2]
3	1,2,3,4

LEAST COST OPTIONS COST TO NEPISIGUIT/CHALEUR REGION = $752,970

[1] The four collection system options are direct haul roadside collection systems similar to existing services, as follows:

OPTION #1: Curbside collection by 1/2 ton non-compaction truck --- direct haulage to disposal site.

OPTION #2: Curbside collection by one-ton non-compaction dump truck --- direct haulage to disposal site.

OPTION #3: Curbside collection by 25 c.y. side-load compaction vehicle --- direct haulage to disposal site.

OPTION #4: Curbside collection by 25 c.y. rear-load compaction vehicle --- direct haulage to disposal site.

[2] See Table 3.3 for definition of the four population zones.

4.0 COST COMPARISON

Table 4.1 presents a summary of the actual annual and per tonne costs of the existing residential waste collection compared to the estimated larger scale waste collection operations in the Nepisiguit/Chaleur Region. The SWATMODEL collection system evaluation indicates that all zones of Run #1 and Run #2 would be best served by one-man operated side-load compaction vehicles.

By moving to collection by side-load compactors in each municipality and for four larger unincorporated area zones, as in Run #1, the Region would save 1.2 percent in costs or just less than $10,000 per annum and $0.85 per tonne. If the entire Region were divided into four large zones and served by side-load compactors, the Region would save 8.0 percent in costs or over $65,000 per annum and $5.69 per tonne.

Economies of scale collection system cost savings are not as significant in the Nepisiguit/Chaleur Region, as experienced elsewhere. This is due to the linear transportation network of the Region, as well as the remote location of Regional Landfill site. The scale advantages achieved in the Region would arise more from better equipment utilization within the larger service areas, than from routing and scheduling efficiencies. Most existing private contractors in the Region supplement their schedule and equipment utilization with commercial and industrial wastes haulage within and around their residential collection service areas.

Table 4.2 presents the breakdown of municipal versus unincorporated area collection system costs of existing and larger scale collection operations. The existing private and public waste collection operations serving the municipalities are providing roadside collection services at costs notably less than estimates by SWATMODEL for the larger zone aggregations. This is due to the supplementary equipment utilization in serving commercial and industrial firms by the private haulers. Run #1 has the same municipal zones as served at present by existing operations. Except for the City of Bathurst, these municipal zones (ie. Zone 1, 2, 3 and 4) have ample excess equipment capacity and therefore, higher unit costs. In Run #2 municipal Zones 1, 2, 3 and 4 are combined and achieve better scale economies that are closer to the existing collection operations costs.

In the unincorporated areas of the Region, however, there appears to be substantial potential economies of scale advantages in providing collection services to larger zones by larger contractors. Although most of the existing waste haulers operating in the unincorporated areas of the Region also supplement their businesses with commercial and industrial waste collection, the smaller service areas result in higher unit costs than would larger service areas.

Table 4.1

COST COMPARISON OF EXISTING RESIDENTIAL WASTE COLLECTION
WITH LARGER SCALE OPERATIONS ($1990)

Collection System Case	Annual Cost	Cost Per Tonne	Difference From Existing System		
			Cost	Cost Per Tonne	%
Existing[1]	$818,503	$71.06	----	----	----
Run #1[2]	808,689	$70.21	-$9,814	-$0.85	-1.2
Run #2[3]	$752,970	$65.37	-$65,533	-$5.69	-8.0

[1] See Table 2.1 for description of the 14 collection service areas (five municipalities and nine rural areas) comprising the existing collection system case.

[2] See Table 3.1 for description of the 9 zones (five municipalities and four rural areas) comprising Run #1 collection system case. Run #1 least-cost collection system is roadside collection direct haul by one-man operated side-load compaction vehicles.

[3] See Table 3.3 for description of the 4 regional zones comprising Run #2 collection system case. Run #2 least-cost collection system is roadside collection direct haul by one-man operated side-load compaction vehicles.

Table 4.2

MUNICIPAL AND UNINCORPORATED AREAS WASTE COLLECTION COST COMPARISON OF EXISTING VERSUS LARGER SCALE OPERATIONS ($1990)

Collection Systems	Municipalities	Unincorporated Areas	Region
Existing Collection System:[1]			
$ Total:	$438,777	$379,726	$818,503
$/te:	$62.70	$84.01	$71.06
$/HH:	$52.17	$74.30	$60.54
Run #1: Municipal and Four Rural Zones:[2]			
$ Total:	$515,890	$292,799	$808,689
$/te:	$73.72	$64.78	$70.21
$/HH:	$61.34	$57.29	$59.81
Run #2: Four Regional Zones:[3]			
$ Total:	$464,337	$288,633	$752,970
$/te:	$66.35	$63.86	$65.37
$/HH:	$55.21	$56.47	$55.69

1 See Table 2.1 for description of existing collection service areas.

2 See Table 3.1 for description of Run #1 zones.

3 See Table 3.3 for description of Run #2 zones.

5.0 SUMMARY

The following points summarize the key findings of the study:

- The linear population dispersal along the coastal highway and the lack of an interconnecting highway "grid" network of the Nepisiguit/Chaleur Region reduces its potential for economies of scale in development of larger residential waste collection systems. This is compounded by the remoteness of the Regional Landfill Site from most of the Region's population.

- Existing roadside residential waste collection services provided within the municipalities of the Region appear to be at a very reasonable cost.

- Cost reductions could be achieved in the unincorporated areas of the Region by contracting residential waste collection services for larger zones, as opposed to the nine service area contracts presently negotiated by the Commission.

- The potential benefits in collection service cost savings by moving to larger contract service areas in the unincorporated areas of the Region of up to $90,000 should be weighed against the potential negative impacts on employment of the local waste haulers presently in operation.